Wisconsin Electric
A WISCONSIN ENERGY COMPANY

Wisconsin Electric
231 W. Michigan
P.O. Box 2046
Milwaukee, WI 53201-2046
Phone 414 221-2345

April 24, 2000

Mr. William Grimley / Ms Lara Autry
Emissions Measurement Center
Interstate 40 and Page Road
Room Number E-108 / E-128
Durham, NC 27711

RE: Mercury Flue Gas Measurements
Valley Power Plant, Boiler 3 (Unit-2)

Dear Mr. Grimley and Ms Autry:

Enclosed are (3) copies of the test report for flue gas measurements performed on Boiler 3, Unit 2 at the Valley Power Plant. As you may know, Units 1 and 2 are equipped with fabric filter particulate control devices. The flue gas sampling was conducted by Mostardi-Platt, under contract to EPRI. The flue gas analytical work was performed by TEI Analytical, Inc. The coal and flyash samples were originally analyzed by Commercial Testing & Engineering. However, upon review of these analyses by ourselves and EPRI, we determined that the values were suspect in that they did not closely reflect the results of the one-year ICR coal analysis program that was conducted by the company at this facility. We subsequently decided to have the samples reanalyzed by the EERC. The EERC's analyses were then used to calculate the mass balance for mercury at this plant. The report was prepared by Mostardi-Platt.

Please contact me at (414) 221-2293 with any questions regarding this submittal.

Sincerely,

Terry Coughlin

Terry Coughlin
Air Quality Team Leader

cc: Paul Chu, EPRI
Jim Platt, Mostardi-Platt

SPECIATED MERCURY EMISSIONS TESTING

Performed For
ELECTRIC POWER RESEARCH INSTITUTE

At The
Wisconsin Electric Power Company
Valley Power Plant
Boiler 3
Baghouse Inlet and Outlet
Milwaukee, Wisconsin

November 30, 1999

Mostardi Platt

Mostardi-Platt Associates, Inc.
A Full-Service
Environmental Consulting
Company

945 Oaklawn Avenue
Elmhurst, Illinois 60126-1012
Phone 630-993-9000
Facsimile 630-993-9017

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November 30, 1999

MOSTARDI PLATT PROJECT 94805
DATE SUBMITTED: APRIL 21, 2000

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CERTIFICATION SHEET

Having supervised and worked on the test program described in this report, and having written this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

Data collected under the supervision of others is included in this report and is presumed to have been gathered in accordance with recognized standards.

MOSTARDI-PLATT ASSOCIATES, INC.

James R. Platt
Vice President, Emissions Services

Reviewed by:

Frank H. Jarke
Manager, Analytical and Quality Assurance

EXECUTIVE SUMMARY

This test report presents the results of the speciated mercury test program performed on Boiler 3 at the Wisconsin Electric Power Company's (WEPCOs) Valley Power Plant.

The test program was sponsored by WEPCO and Electric Power Research Institute (EPRI). The test program was completed by MOSTARDI-PLATT ASSOCIATES, INC. (Mostardi Platt). The test program was performed on November 30, 1999.

The WEPCO Valley Power Plant was selected by the U.S. Environmental Protection Agency (EPA), Office of Air Quality Planning and Standards (OAQPS) to satisfy the Information Collection Request (ICR) requirement. During the ICR test program, mercury speciation testing was performed on Boiler 3. The results obtained during the ICR test program are provided in the Speciated Mercury Emissions Testing report dated April 2000. This data was collected to further validate the ICR measurements.

Mercury emissions testing using the Ontario Hydro method was performed on the air heater inlet and outlet of the ESP serving Boiler 3. Representative samples of the coal, and baghouse ash stream were sampled in conjunction with the emissions testing.

Table ES-1 presents a summary of the average speciated mercury concentrations and mass rate results for the Boiler 3 test location. In addition, the average percent of particulate bound, oxidized, and elemental mercury in comparison to the total mercury are provided. Also presented on Table ES-1 are the measured mercury removal efficiencies and calculated mercury material balance for the tests performed on Boiler 3.

Detailed discussions and presentations of all test data and data test results are provided in Sections 1 through 5 of this report.

TABLE ES-1 SUMMARY OF MERCURY SPECIATION TEST RESULTS BOILER 3				
	Baghouse Inlet		Baghouse Outlet	
PARAMETERS	**Average of Test Runs**	**Average % of Total**	**Average of Test Runs**	**Average % of Total**
PROCESS DATA:				
Steam Flow, Klbs/hr	648.8	—	648.8	—
Coal Feed Rate lb/hr	66,300		66,300	
Coal Btu content, Btu/lb (as received)	12,192		12,192	
Heat Input, 10^6Btu/hr (F-Factor)	920		920	
Mercury Concentration, ug/g	0.012		0.012	
Mercury Emission rate, lbs/hr	7.5 E-04		7.5 E-04	
PARTICULATE BOUND MERCURY EMISSIONS:				
Concentration, ug/m^3	0.04	2.1	0.04	2.4
Concentration, ug /Nm^3	0.04		0.04	
Emission rate, lbs/10^{12} Btu	0.03		0.04	
Emission rate, lbs/hr	3.0 E-05		4.0 E-05	
OXIDIZED MERCURY EMISSIONS:				
Concentration, ug/m^3	1.11	62.8	1.44	78.4
Concentration, ug /Nm^3	1.19		1.55	
Emission rate, lbs/10^{12} Btu	0.98		1.28	
Emission rate, lbs/hr	8.2 E-04		1.17 E-03	
ELEMENTAL MERCURY EMISSIONS:				
Concentration, ug/m^3	0.62	35.1	0.35	19.2
Concentration, ug /Nm^3	0.67		0.38	
Emission rate, lbs/10^{12} Btu	0.55		0.31	
Emission rate, lbs/hr	4.6 E-04		2.9 E-04	
TOTAL MERCURY EMISSIONS:				
Concentration, ug/m^3	1.77	—	1.83	—
Concentration, ug /Nm^3	1.90		1.96	
Emission rate, lbs/10^{12} Btu	1.56		1.63	
Emission rate, lbs/hr	1.30 E-03		1.49 E-03	
TOTAL MERCURY REMOVAL EFFICIENCY:			—	
MERCURY MATERIAL BALANCE:			*	

* A mass balance calculation was attempted for this facility. Using the EERC's values for mercury in coal and ash, as well as the flue gas inlet and outlet measurements, the outlet flux exceeds the input flux by a factor of 2.24. This would suggest that either our estimates of coal feed to the boiler was off by a factor >2 (very unlikely) or that the coal sample used for EERC's analysis was not representative of the coal fired during the entire ICR flue gas measurement time. When we substitute our ICR – Part II derived coal data into the equation (0.02 ppm), we achieve a mass balance of 113%. In addition, it is also possible that the inlet flue gas determination is biased low, since using 0.02 ppm for mercury in the coal yields a net mercury removal factor for this fabric filter equipped facility of 0%. The removal factor of a similar fabric filter WEPCO Presque Isle Power Plant – Units 1-4 was 80%, while firing on a very similar coal.

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Baghouse Inlet and Outlet
Milwaukee, Wisconsin
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1.0 INTRODUCTION

1.1 Summary of Test Program

The United States Environmental Protection Agency (USEPA), is using its authority under section 114 of the Clean Air Act, as amended, to require that selected coal-fired utility steam generating units provide certain information that will allow the USEPA to calculate the annual mercury emissions from each unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The Emission Measurement Branch (EMB) of the Office of Air Quality Planning and Standards (OAQPS) oversees the emission measurement activities. MOSTARDI-PLATT ASSOCIATES, INC. (Mostardi Platt) conducted the mercury emission measurements.

The USEPA selected the Valley Power Plant of Wisconsin Electric Power Company (WEPCO) in Milwaukee, Wisconsin to be one of seventy-eight coal-fired utility steam generating units to conduct mercury emissions measurements. Testing was performed at Boiler 3 on November 30, 1999. Simultaneous measurements were conducted at the Baghouse Inlet and Outlet. Mercury emissions were speciated into elemental, oxidized and particle-bound mercury using the Ontario-Hydro test method. Fuel samples were also collected concurrently with Ontario-Hydro samples in order to determine fuel mercury content.

- Mostardi Platt Vice President, James Platt 630-993-9000
- WEPCO Plant Coordinator, Brenda Bergemann 414-221-2459
- EPRI Program Manager, Paul Chu 650-855-2812

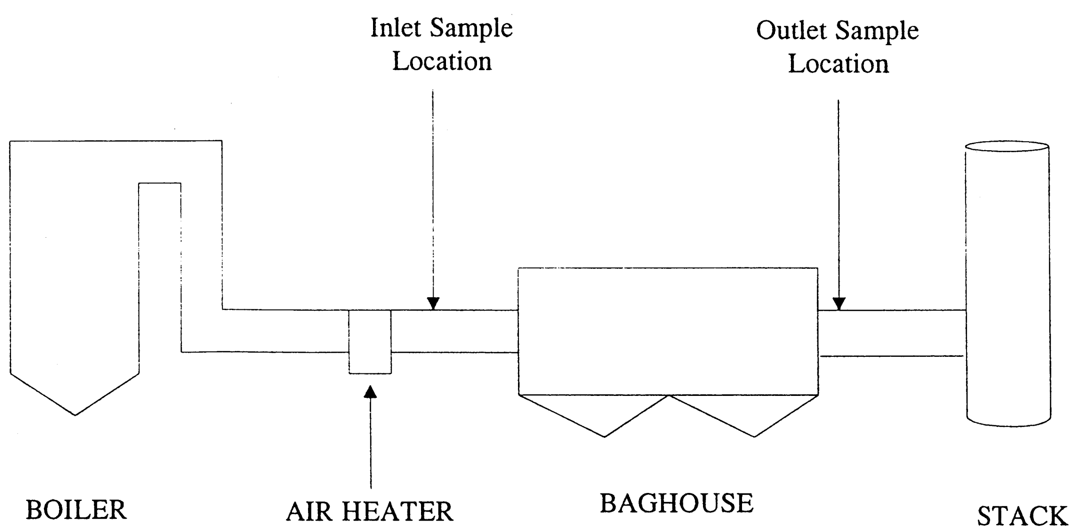
2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 Process Description

Valley Boiler 3 is a front wall-fired, balanced draft boiler with a name plate rating of 650,000 pounds of steam per hour. Figure 2-1 shows a schematic of the boiler and pollution control equipment, including sample points.

Boiler 3 is a pulverized coal-fired steam boiler. The steam is converted into mechanical energy by flowing through a turbine (generator) which produces electrical power. The unit was operating at or near full load during the tests. Fuel type, boiler operation and control device operation were maintained at normal operating conditions.

Figure 2-1 Schematic of the Boiler and Pollution Control Equipment



The following is a list of operating components for this unit:

- Riley Stoker pulverized coal, front wall-fired, balanced draft boiler
- 650,000 pounds of steam per hour

- Fuel: Western Bituminous Coal (85%) and Petroleum Coke (15%) Blended by Oxbow Carbon and Minerals, Inc., 1.60% Sulfur
- SO_2 control: None
- NO_X control: Riley Stoker Model CCV Low NO_X Burners
- Environmental Elements Fabric Filter Baghouse

2.2 Control Equipment Description

Particulate emissions from the boiler are controlled by an Environmental Elements Fabric Filter Baghouse with an average collection efficiency of 99.8%. The Boiler is also equipped with Riley Stoker low NO_X burners.

The flue gas at the inlet was approximately 315°F. At the outlet, the gas temperature was approximately 315°F and contained approximately 7 percent (7%) moisture.

2.3 Flue Gas Sampling Locations

2.3.1 Inlet Location

Inlet samples were collected at the baghouse inlet. A schematic and cross section of the inlet location are shown in Figure 2-2. This location meets the requirements of USEPA Method 1. Ash samples were taken from the baghouse hopper to confirm the particulate phase mercury.

2.3.2 Outlet Location

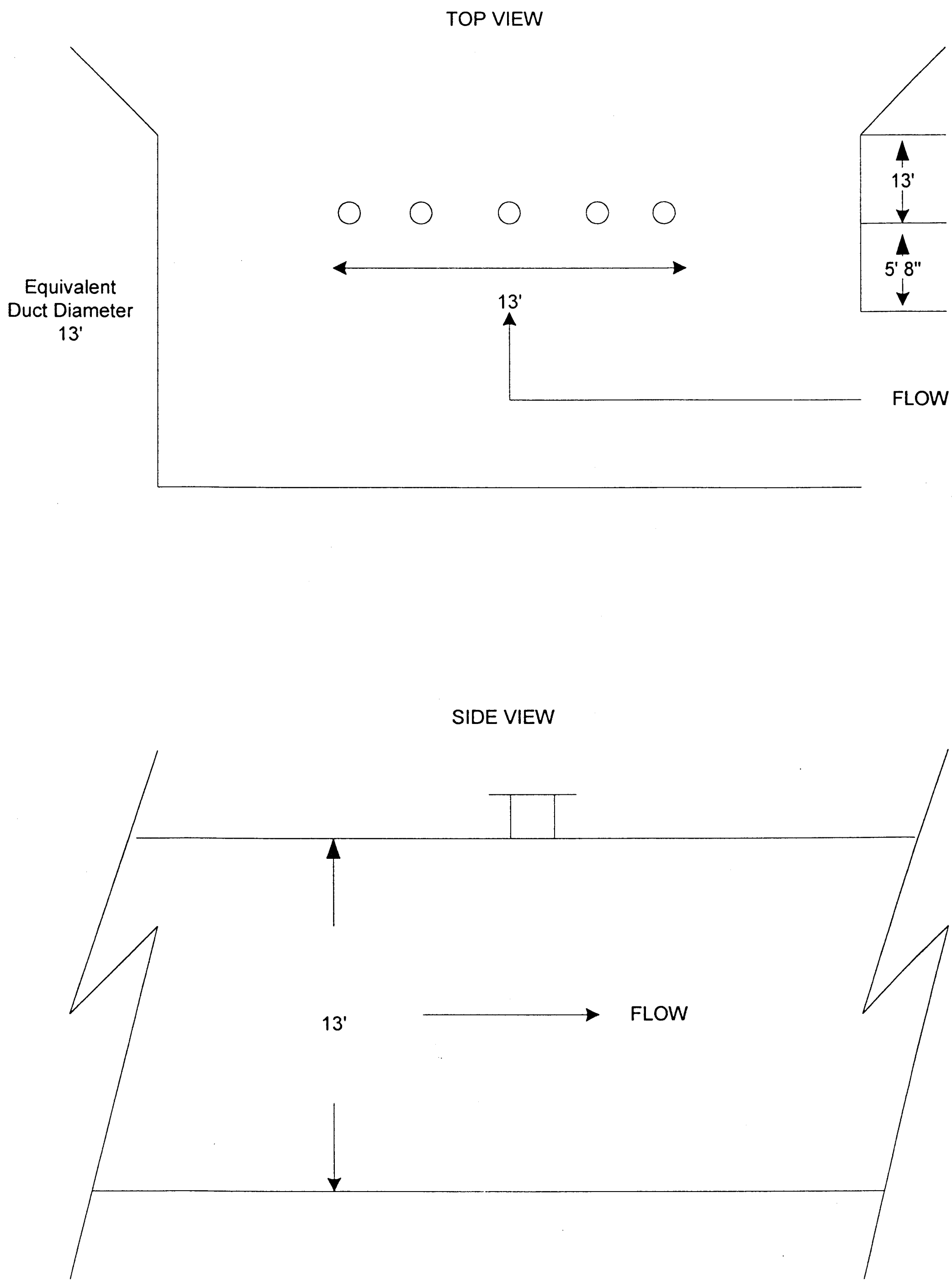
Outlet samples were collected at the baghouse outlet sample ports. A schematic and cross section of the stack location is shown in Figure 2-3. This location meets the requirements of USEPA Method 1. A probe support system was erected in order to sample vertically down into the duct.

The flue gas at the outlet was above the method specification of a minimum filtration temperature of 120°C. Therefore, in stack filtration per Method 17 was used.

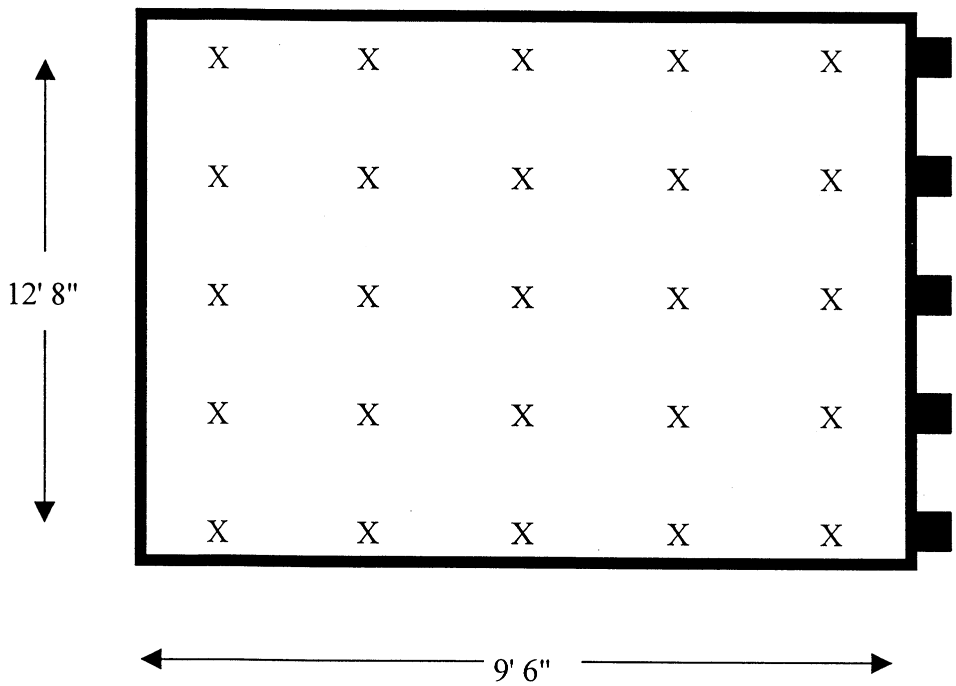
2.4 Fuel Sampling Location

Fuel samples were collected at the fuel feeders to each individual pulverizing mill. One sample was collected from each feeder during each test run, and the feeder samples collected during a test run were composited prior to analysis. The Mostardi-Platt test crew supervisor assisted plant personnel with the collection of fuel samples.

Figure 2-2 Schematic of the Valley Power Plant Baghouse Inlet Sampling Location



Equal Area Traverse For Rectangular Ducts (Inlet)

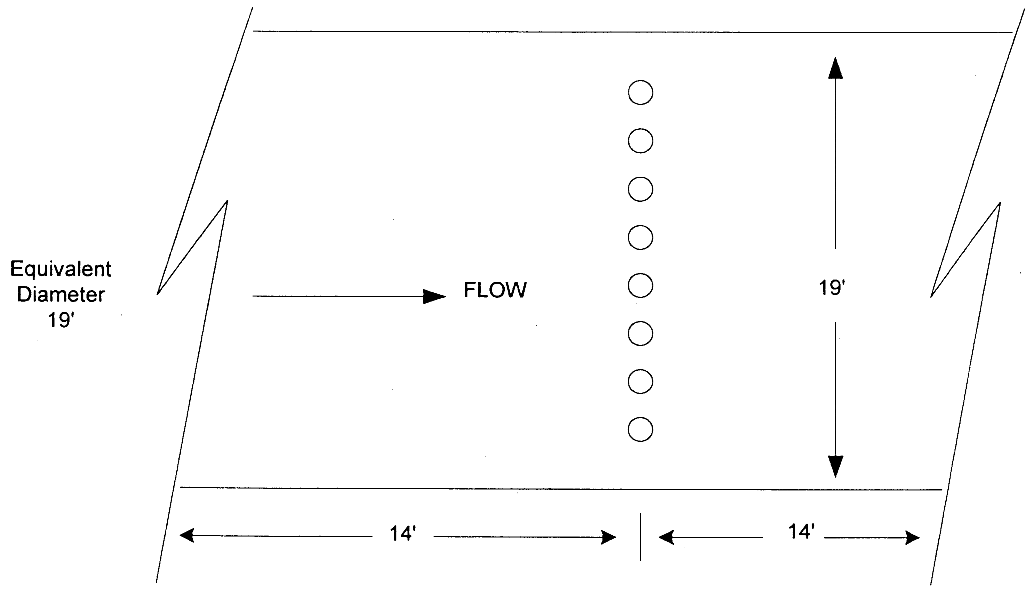


Job:	Wisconsin Electric Power Company Valley Power Plant		
Date:	November 30, 1999	Area:	120.33 ft^2
Unit No:	3	No. Test Ports:	5
Length:	9 Feet 6 Inches	Tests Points per Port:	5
Width:	12 Feet 8 Inches	Distance Between Ports:	2.53 Feet
Duct No:	Inlet	Distance Between Points:	2.375 Feet

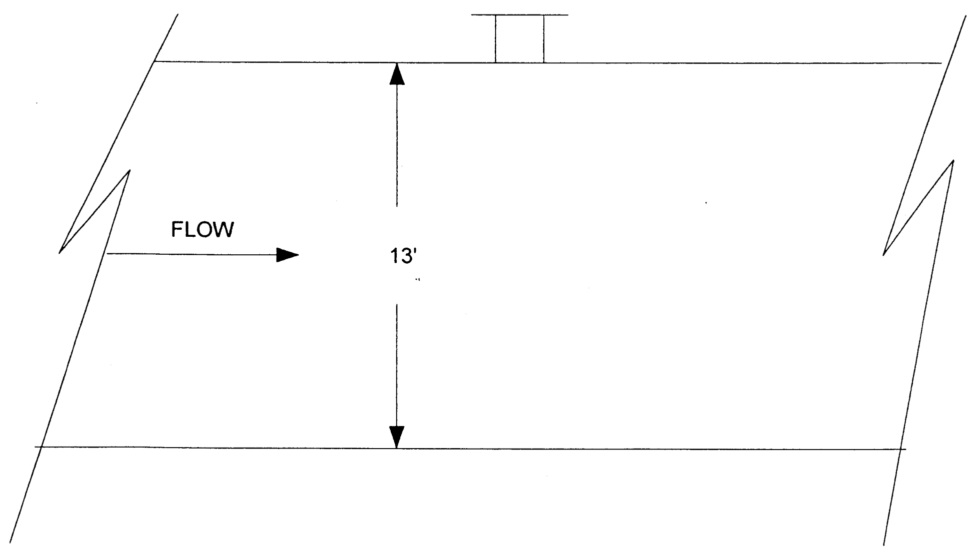
Figure 2-3 Schematic of the Valley Power Plant Baghouse Outlet Sampling Location

(Two (2) Ducts)

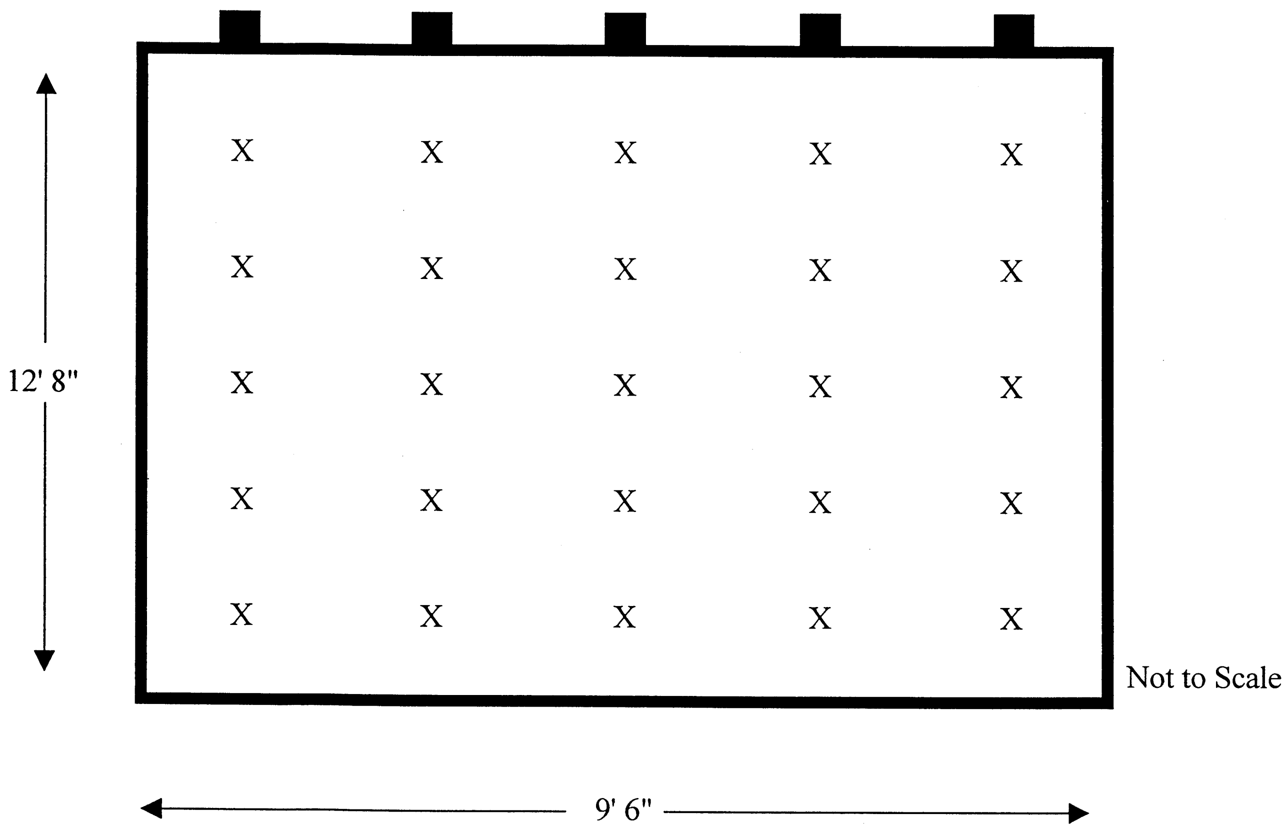
TOP VIEW



SIDE VIEW



Equal Area Traverse For Rectangular Ducts (Outlet)



Job:	Wisconsin Electric Power Company Valley Power Plant		
Date:	November 30, 1999	Area:	120.33 ft^2
Unit No:	3	No. Test Ports:	5
Length:	12 Feet, 8 Inches	Tests Points per Port:	5
Width:	9 Feet, 6 Inches	Distance Between Ports:	2.375 Feet
Duct No:	Outlet	Distance Between Points:	3.167 Feet

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of the test program was to quantify mercury emissions from this unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The specific objectives, in order of priority were:

- Compare mass flow rates of mercury at the three sampling locations (fuel, inlet to and outlet from the baghouse).
- Measure speciated mercury emissions at the outlet.
- Measure speciated mercury concentrations at the inlet of the last air pollution control device.
- Measure mercury and chlorine content from the fuel being used during the testing.
- Measure the oxygen and carbon dioxide concentrations at the inlet and the outlet.
- Measure the volumetric gas flow at the inlet and the outlet.
- Measure the moisture content of the flue gas at the inlet and the outlet.
- Provide the above information to the USEPA for use in establishing mercury emission factors for this type of unit.

The test matrix is presented in Table 3-1. The table shows the testing performed at each location, methodologies employed and responsible organization.

Table 3-1
TEST MATRIX FOR THE WEPCO - VALLEY POWER PLANT

Sampling Location	No. of Runs	Parameters	Sampling Method	Sample Run Time (min)	Analytical Method	Analytical Laboratory
Outlet	3	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Outlet	3	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Outlet	3	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Outlet	3	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Inlet	3	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Inlet	3	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Inlet	3	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Inlet	3	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Fuel Feeders	3	Hg, Cl in Fuel	Grab	1 Sample Per Feeder Per Run	ASTM D3684 (Hg) ASTM D4208 (Cl)	CTE
Fuel Feeders	3	Hg in Fuel	Grab	1 Sample Per Feeder Per Run	EPA 7473	EERC
Precipitator Hopper	3	Hg in Ash	Grab	1 Sample Per Run	EPA 7471a	EERC

3.2 Field Test Changes and Problems

There were no field test changes or problems encountered during this test program.

3.3 Presentation of Results

3.3.1 Mercury Mass Flow Rates

The mass flow rates of mercury determined at each sample location are presented in Table 3-2.

Table 3-2
SUMMARY OF RESULTS

Sample Location	Elemental Mercury (lb/hr)	Oxidized Mercury (lb/hr)	Particle-Bound Mercury (lb/hr)	Total Mercury (lb/hr)
Fuel				
Run 1				0.00056
Run 2				0.00079
Run 3				0.00089
Average				**0.00075**
Baghouse Inlet				
Run 1	0.00071	0.00084	0.00002	0.00158
Run 2	0.00027	0.00089	0.00003	0.00120
Run 3	0.00039	0.00072	0.00002	0.00113
Average	**0.00046**	**0.00082**	**0.00003**	**0.00130**
Baghouse Outlet				
Run 1	0.00025	0.00126	0.00007	0.00159
Run 2	0.00027	0.00100	0.00003	0.00130
Run 3	0.00034	0.00124	0.00000	0.00159
Average	**0.00029**	**0.00117**	**0.00004**	**0.00149**

3.3.2 Comparison of Volumetric Flow Rate

Volumetric flow rate is a critical factor in calculating mass flow rates. Ideally, the volumetric flow rate (corrected to standard pressure and temperature) measured at the inlet to the control device should be the same as that measured at the stack, which should be the same as that measured by the continuous emissions monitoring system (CEMS). A comparison of the volumetric flowrates on a thousand standard cubic foot per minute basis (KSCFM) is given in Table 3-3.

Table 3-3 COMPARISON OF VOLUMETRIC FLOW RATE DATA						
	Inlet			Outlet		
Run No.	KACFM	KSCFM	KDSCFM	KACFM	KSCFM	KDSCFM
Run 1	321.4	213.2	196.9	349.4	228.7	212.6
Run 2	324.4	215.4	199.6	360.5	235.5	219.0
Run 3	317.9	211.1	195.2	366.4	239.3	222.3
Average	321.2	213.2	197.3	358.8	234.5	218.0

The measured flowrate (KSCFM) at the inlet was 10% less than that measured at the outlet. Both the inlet and outlet test locations met the requirements of USEPA Method 1. A comparison of the inlet and outlet locations with the stack CEM could not be made since the measurements are only representative of one of the two boilers that flow into this stack.

3.3.3 Individual Run Results

A detailed summary of results for each sample run at the baghouse inlet and outlet test locations are presented in Tables 3-4 and 3-5, respectively.

3.3.4 Process Operating Data

The process operating data collected during the tests is included in Appendix A. A summary of the coal usage and mass emission rate of mercury available from coal are presented in Table 3-6.

A fly ash sample was collected during the tests and sent to EERC and CTE to be analyzed for mercury content. The results from EERC were used to report final ash content. All results are given in Appendix F.

Table 3-4
BAGHOUSE INLET INDIVIDUAL RUN RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Source Condition		Normal		
Fuel Factor, dscf/10^6 Btu	9705	9752	9630	
Date	11/30/99	11/30/99	11/30/99	
Start Time	9:01	12:00	14:50	
End Time	11:13	14:13	17:02	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	1.330	0.362	0.570	0.754
H_2SO_4-$KMnO_4$, ug detected	0.439	0.306	0.413	0.386
Reported, ug	1.769	0.668	0.983	1.140
ug/dscm	0.97	0.36	0.54	0.62
lb/hr	0.00071	0.00027	0.00039	0.00046
lb/10^{12} Btu	0.86	0.32	0.47	0.55
Oxidized Mercury:				
KCl, ug detected	2.096	2.216	1.806	2.039
Reported, ug	2.096	2.216	1.806	2.039
ug/dscm	1.15	1.19	0.98	1.11
lb/hr	0.00084	0.00089	0.00072	0.000819
lb/10^{12} Btu	1.01	1.06	0.86	0.98
Particle-bound Mercury:				
Filter, ug detected	0.060	0.057	0.046	0.054
HNO_3, ug detected	<0.003	0.025	0.014	<0.014
Reported, ug	0.062	0.082	0.060	0.068
ug/dscm	0.03	0.04	0.03	0.04
lb/hr	0.00002	0.00003	0.00002	0.00003
lb/10^{12} Btu	0.03	0.04	0.03	0.03
Total Inlet Speciated Mercury:				
ug/dscm	2.15	1.60	1.55	1.77
lb/hr	0.00158	0.00120	0.00113	0.00130
lb/10^{12} Btu	1.90	1.42	1.35	1.56
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	321,379	324,413	317,870	321,221
@ Standard Conditions, dscfm	196,932	199,585	195,247	197,255
Average Gas Temperature, °F	314.6	313.8	313.6	314.0
Average Gas Velocity, ft/sec	44.51	44.93	44.03	44.49
Flue Gas Moisture, percent by volume	7.63	7.35	7.52	7.50
Average Flue Pressure, in. Hg	29.12	29.12	29.12	
Barometric Pressure, in. Hg	30.11	30.11	30.11	
Average %CO_2 by volume, dry basis	11.4	11.4	11.5	11.4
Average %O_2 by volume, dry basis	6.6	6.6	6.5	6.6
% Excess Air	43.86	43.86	42.91	43.54
Dry Molecular Wt. of Gas, lb/lb-mole	30.088	30.088	30.100	
Gas Sample Volume, dscf	64.606	65.513	64.821	
Isokinetic Variance	100.6	100.6	101.8	

Laboratory Analysis can be found in Appendix F.

Table 3-5
BAGHOUSE OUTLET INDIVIDUAL RUN RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Source Condition	Normal			
Fuel Factor, dscf/10^6 Btu	9705	9752	9630	
Date	11/30/99	11/30/99	11/30/99	
Start Time	9:00	12:00	14:50	
End Time	11:25	14:17	17:10	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	0.339	0.478	0.773	0.530
H_2SO_4-$KMnO_4$, ug detected	0.280	0.164	0.070	0.171
Reported, ug	0.619	0.642	0.843	0.701
ug/dscm	0.32	0.33	0.41	0.35
lb/hr	0.00025	0.00027	0.00034	0.00029
lb/10^{12} Btu	0.29	0.30	0.36	0.31
Oxidized Mercury:				
KCl, ug detected	3.086	2.386	3.086	2.853
Reported, ug	3.086	2.386	3.086	2.853
ug/dscm	1.59	1.23	1.50	1.44
lb/hr	0.00126	0.00100	0.00124	0.00117
lb/10^{12} Btu	1.42	1.10	1.32	1.28
Particle-bound Mercury:				
Filter, ug detected	0.183	0.068	<0.013	<0.088
HNO_3, ug detected	ND <0.003	ND <0.003	ND <0.003	ND <0.003
Reported, ug	0.183	0.068	0.006	0.086
ug/dscm	0.09	0.03	0.00	0.04
lb/hr	0.00007	0.00003	0.00000	0.00004
lb/10^{12} Btu	0.08	0.03	0.00	0.04
Total Outlet Speciated Mercury:				
ug/dscm	2.00	1.59	1.91	1.83
lb/hr	0.00159	0.00130	0.00159	0.00149
lb/10^{12} Btu	1.79	1.42	1.69	1.63
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	349,382	360,499	366,420	358,767
@ Standard Conditions, dscfm	212,638	219,014	222,318	217,990
Average Gas Temperature, °F	316.1	317.6	317.8	317.2
Average Gas Velocity, ft/sec	48.39	49.93	50.75	49.69
Flue Gas Moisture, percent by volume	7.02	7.00	7.11	7.04
Average Flue Pressure, in. Hg	28.79	28.79	28.79	
Barometric Pressure, in. Hg	30.11	30.11	30.11	
Average %CO_2 by volume, dry basis	11.2	11.0	11.2	11.1
Average %O_2 by volume, dry basis	6.8	6.7	6.7	6.7
% Excess Air	45.80	44.59	44.74	45.04
Dry Molecular Wt. of Gas, lb/lb-mole	30.064	30.028	30.060	
Gas Sample Volume, dscf	68.733	68.778	72.889	
Isokinetic Variance	95.1	92.4	96.5	

Laboratory Analysis can be found in Appendix F.

Table 3-6
COAL USAGE RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Date	11/30/99	11/30/99	11/30/99	
Start Time	9:00	12:00	14:50	
End Time	11:25	14:17	17:10	
Coal Properties:				
Carbon, % dry	75.22	75.21	75.42	75.28
Hydrogen, % dry	4.89	4.94	4.94	4.92
Nitrogen, % dry	1.69	1.67	1.68	1.68
Sulfur, % dry	0.85	0.85	0.92	0.87
Ash, % dry	7.88	7.82	7.14	7.61
Oxygen, % dry (by difference)	9.47	9.51	9.90	9.63
Volatile, % dry	37.42	37.13	36.91	37.15
Moisture, %	8.70	8.35	8.91	8.65
Heat Content, Btu/lb dry basis	13318	13269	13456	13348
F_d Factor O_2 basis, dscf/10^6 Btu	9705	9752	9630	9696
F_c Factor CO_2 basis, scf/10^6 Btu	1813	1819	1799	1811
Chloride, ug/g dry	124.0	134.0	125.0	127.7
Mercury, ug/g dry *	0.0092	0.013	0.015	0.012
Coal Consumption:				
Feeder A, Klbs/hr	33.0	32.8	32.0	
Feeder B, Klbs/hr	34.0	33.9	33.4	
Total Raw Coal Input, Klbs/hr	67.0	66.6	65.4	66.3
Total Coal Input, lbs/hr dry	61171	61039	59573	60594
Total Mercury Available in Coal:				
Mercury, lbs/hr	0.00056	0.00079	0.00089	0.00075
Mercury, lbs/10^{12} Btu	0.69	0.98	1.11	0.93
Mercury Content in Fly Ash:				
Mercury, ug/g*	0.0363	0.0363	0.0363	0.0363

* Results were provided by EERC
Laboratory Analysis can be found in Appendix F.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

4.1.1 Speciated mercury emissions

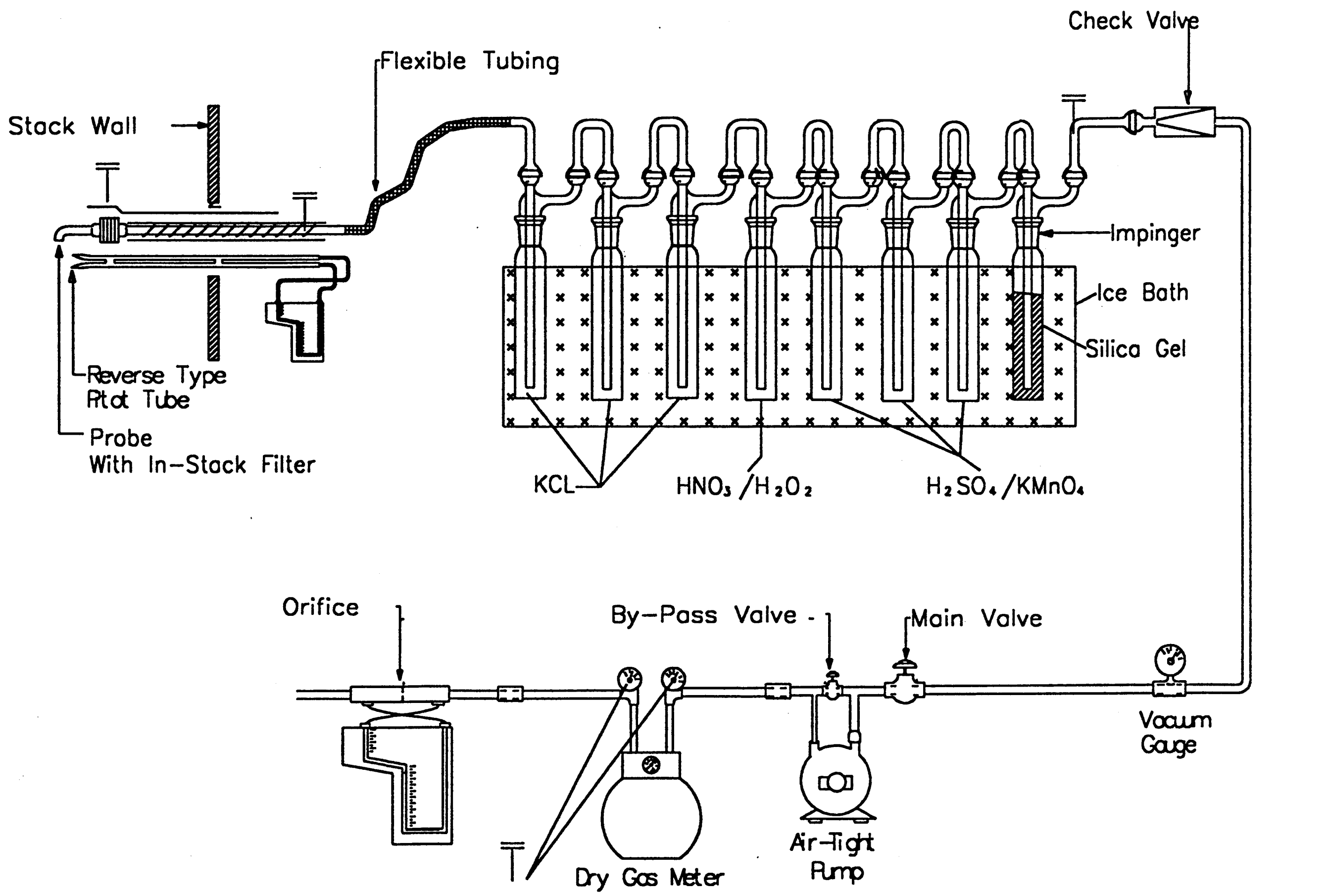
Speciated mercury emissions were determined via the draft "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario-Hydro Method)", dated April 8, 1999. Any revisions to this test method issued after April 8, 1999, but before July 1, 1999, were incorporated.

The in-stack filtration (Method 17) configuration was utilized at the baghouse inlet and outlet test locations. Figure 4-1 is the schematic of the Ontario-Hydro sampling train.

Figure 4-2 illustrates the sample recovery procedure. The analytical scheme was per Section 13.3 of the Ontario-Hydro Method.

Speciated Mercury Sampling Train Equipped with In-Stack Filter

Ontario Hydro Method



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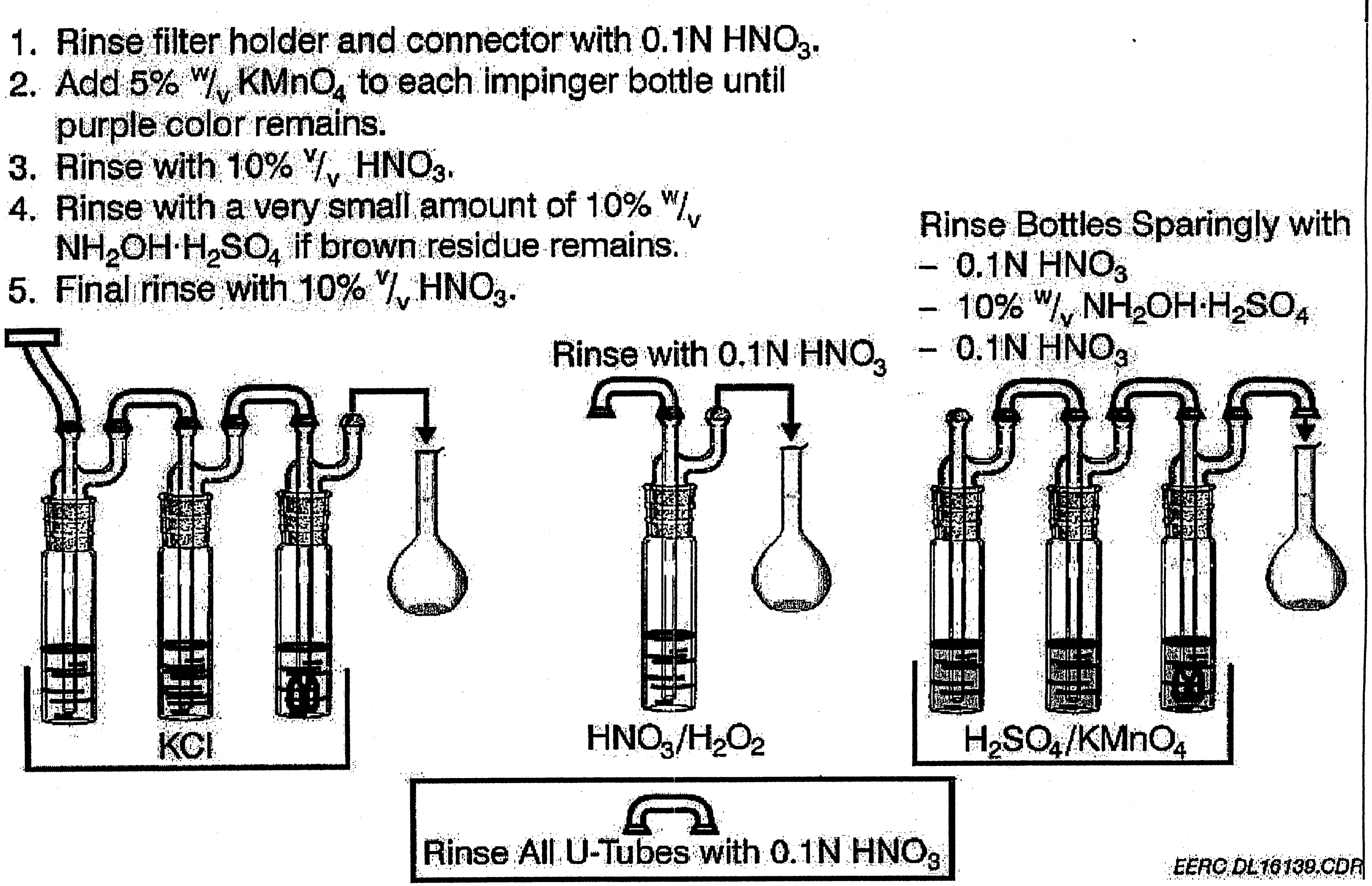

Figure 4-2 Sample Recovery Scheme for Ontario-Hydro Method Samples

4.1.2 Fuel samples

Fuel samples were collected by composite sampling. A sample was collected during each speciated mercury sampling run. Sample analysis was conducted according to the procedures of ASTM D3684, EPA 7473, EPA 7471a and ASTM D4208. A split sample was sent to both CTE and EERC for mercury analysis. An EPRI study has indicated that the procedures of ASTM D3684, used by CTE, may yield highly variable mercury results. Therefore, the results from the EPA 7473 method used by EERC were used to determine the mercury concentration. All sample analysis can be found in Appendix F.

4.2 Procedures for Obtaining Process Data

Plant personnel were responsible for obtaining process-operating data. The process data presented in Table 3-6 was continuously monitored by the facility. Process data was averaged over the course of each sample run.

4.3 Sample Identification and Custody

The chain-of-custody for all samples obtained for analysis can be found in Appendix E.

5.0 INTERNAL QA/QC ACTIVITIES

All sampling, recovery and analytical procedures conform to those described in the site specific test plan. The precision and accuracy related to the speciated fractions are given in Appendix F. The accuracy of the results is given as CPI (recovery of an independent standard obtained from CPI) and the precision of the results is given as %RSD (relative standard deviation). All resultant data was reviewed by the laboratory and Mostardi Platt per the requirements listed in the QAPP and were determined to be valid except where noted below.

5.1 QA/QC Problems

Reagent blanks are required to be less than ten times the detection limit or ten percent of the sample values found. Train blanks are required to be less than thirty percent of the sample values found. Reagent and train blanks that did not meet these requirements are identified in Section 5.2. The test results for these samples have been qualified per the QAPP.

5.2 QA Audits

5.2.1 Reagent Blanks

As required by the method, blanks were collected for all reagents utilized. The results of reagent blank analysis are presented in Table 5-1.

Table 5-1
REAGENT BLANK ANALYSIS

Sample ID	Sample Fraction	Contents	Mercury (μg)	Detection Limit (μg)
040	Front-half	0.1N HNO_3/Filter	< 0.003	0.003
041	1 N KCl	1 N KCl	0.004	0.003
042	HNO_3/H_2O_2	HNO_3/H_2O_2	< 0.007	0.007
043	$KMnO_4/H_2SO_4$	$KMnO_4/H_2SO_4$	0.008	0.003

5.2.2 Blank Trains

As required by the method, blank trains were collected at both the inlet and stack sampling locations. These trains were collected on November 30, 1999. The results of blank train analysis are presented in Table 5-2.

Table 5-2
BLANK TRAIN ANALYSIS

Sample ID	Sample Fraction	Contents	Mercury (μg)	Detection Limit (μg)
037, 038, 039	Front-half	Filter	0.035	0.013
031	KCl impingers	Impingers/rinse	0.388	0.03
034	KCl impingers	Impingers/rinse	0.363	0.03
032*	HNO_3-H_2O_2 impingers	Impingers/rinse	0.279	0.04
035*	HNO_3-H_2O_2 impingers	Impingers/rinse	0.235	0.04
033	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	0.074	0.03
036*	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	0.075	0.03

* Train blank did not meet QAPP criteria – data qualified.

5.2.3 Field Dry Test Meter Audit

The field dry test meter audit described in Section 4.4.1 of Method 5 was completed prior to the test. The results of the audit are presented in Appendix C.